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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/033,694	12/28/2001	Leonardi Salvatore	856063.721	8587

500 7590 09/09/2003

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EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 09/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/033,694

Applicant(s)

SALVATORE, LEONARDI

Examiner

Suk-San Foong

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 42-44 is/are allowed.
- 6) ☒ Claim(s) 1-5,7-9,11-19,21 and 23-41 is/are rejected.
- 7) ☒ Claim(s) 6,23,25 and 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 112***

2. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 24, lines 1-3, it is questioned whether "said nitride layer" is the nitride layer formed and etched as recited in claim 1, lines 4-12. It is not clear how "said nitride layer" contacts the filling material.

***Claim Rejections - 35 USC § 102***

4. Claims 1-5, 7, 8, 13, 31, 32 and 36-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Sugisaka et al. ('722).

Sugisaka et al. is relied on for the teachings discussed in the rejections of paragraph 21 of the Office Action mailed on 1/15/03.

***Claim Rejections - 35 USC § 103***

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5. Claims 9, 11, 12, 27-30, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above, and further in view of Nishizawa et al. ('875).

Sugisaka et al. does not disclose doping the trench filling material.

Sugisaka et al. does not disclose oxidizing step to form pre-implantation oxide layer.

Nishizawa et al. is relied on for the teachings discussed in the rejections of paragraph 23 of the Office Action mailed on 1/15/03 as providing motivation to enable the formation of trenches 12 and formation of pre-implantation oxide layer of Sugisaka et al. to be performed.

Applicant does not seasonable contest to the taking of Official Notice in the Office Action mailed 1/15/03. Therefore, the object of the well-known statement is taken to be admitted prior art (MPEP 2144.03).

The known method is relied on for the teachings discussed in the rejections of paragraph 23 of the Office Action mailed on 1/15/03 as providing motivation to enable the formation of trenches 12 of Sugisaka et al. to be performed.

6. Claims 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above, and further in view of Yamamoto et al. ('270).

Sugisaka et al. does not teach the steps as recited in claim 14 and 17.

Yamamoto et al. is relied on for the teachings discussed in the rejections of paragraph 24 of the Office Action mailed on 1/15/03 as providing motivation to enable the formation of doped regions 17 and 18 of Sugisaka et al. to be performed.

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Art Unit: 2823

7. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above, and further in view of Park et al. ('310).

Sugisaka et al. does not teach the steps as recited in claims 15 and 16.

Park et al. is relied on for the teachings discussed in the rejections of paragraph 25 of the Office Action mailed on 1/15/03 as providing motivation to enable the formation of doped regions 17 and 18 of Sugisaka et al. to be performed.

8. Claims 18, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above, and further in view of Wolf.

Sugisaka et al. does not disclose the steps of photomasking and etching the further nitride layer at locations of field regions.

Wolf is relied on for the teachings discussed in the rejections of paragraph 26 of the Office Action mailed on 1/15/03 as providing motivation to enable formation field oxide layer of Sugisaka et al. to be performed.

9. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above.

As previously stated in the rejections of paragraph 27 of the Office Action mailed on 1/15/03, the choice of etching ratio between the hardmask nitride layer and an oxide layer would

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Art Unit: 2823

have been a matter of routine optimization to achieve the desired device densities and the desired device characteristics of the device to be formed. (See MPEP 2144.05).

Claims 34, 35 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugisaka et al. ('722) as applied to claims 1-8, 13, 31, 32 and 36-38 above.

Sugisaka et al. does not disclose the step recited in claim 24.

Applicant does not seasonable contest to the taking of Official Notice in the Office Action mailed 1/15/03. Therefore, the object of the well-known statement is taken to be admitted prior art (MPEP 2144.03).

The known method is relied on for the teachings discussed in the rejections of paragraph 28 of the Office Action mailed on 1/15/03 as providing motivation to enable the formation of semiconductor device of Sugisaka et al. to be performed.

### ***Response to Arguments***

10. Applicant argues that Sugisaka et al. does not disclose the usefulness of the nitride layer in the context of the three embodiments as described in p. 13, 4<sup>th</sup> paragraph to p. 14, 1<sup>st</sup> paragraph of the response mailed on 6/16/03. However, the claims are not so limited. It is sufficient the recited process is disclosed or made obvious by Sugisaka et al. alone or in combination with Nishizawa et al., Yamamoto et al., Park et al. or Wolf as stated in the Office Action mailed on 1/15/03.

11. Applicant argues that Nishizawa et al. does not include a nitride layer in formation of the hardmask layer which comprise of oxide and photoresist materials. However, Nishizawa et al. is

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Art Unit: 2823

not relied on for using the hardmask layer. Nishizawa et al. is relied on for the teachings of forming trenches and forming a pre-implantation oxide layer.

12. Applicant argues that Yamamoto et al. does not disclose that the hardmask contains a nitride layer or the semiconductor substrate is an SOI substrate. However, Yamamoto et al. is not relied on for forming hardmask or providing a SOI substrate. Yamamoto is relied on for using the method for the patterning step of Sugisaka et al.

13. Applicant argues that there is no sandwiching a nitride layer with two oxide layers as required in claim 1. However, the claim is not so limited.

***Allowable Subject Matter***

14. Claims 42-44 are allowed.

15. Claims 6, 23, 25 and 26 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

16. Claims 10, 20 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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***Conclusion***

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

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Art Unit: 2823

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



September 7, 2003



George Fourson  
Primary Examiner  
Art Unit 2823